The U. S. 1966-1967 Lunar Orbiter missions to the Moon acquired near complete photographic coverage of the lunar surface. The U. S. Geological Survey is currently completing a 60 meter/pixel resolution global digital mosaic of the Moon, generated from scanned and restored versions of these images. See http://astrogeology.usgs.gov/Projects/LunarOrbiterDigitization/ for details of this project. We will describe here the general procedures being used to photogrammetrically control the lunar orbiter images, while tying them to the existing Unified Lunar Control Network 2005 [ULCN 2005; http://pubs.usgs.gov/of/2006/1367/] reference frame, and the results of our control network solutions.

The Lunar Orbiter images are being photogrammetrically controlled by using a least squares photogrammetric adjustment program. The software in use is based around the core *randlsq* program, originally written by Colvin and Davies at the RAND Corporation, and then modified at USGS and incorporated into the ISIS 2 software package [http://isis.astrogeology.usgs.gov/Isis2/isis-bin/isis.cgi]. This software uses as input observations tie point measurements (in line and sample) of "control" points on overlapping images. It also uses a priori information in the form of approximate point positions (latitude, longitude, and radius), camera orientation (camera bore sight information in the form of right ascension, declination, and twist), and camera (spacecraft) position, in Cartesian coordinates (X, Y, and Z) in the lunar mean Earth/polar axis system and relative to the center of mass of the Moon. A priori camera angle and position information is obtained from printouts published in the late 1960's by Boeing. In order to tie these images to existing data in the mean Earth/polar axis system, we fix some points (a few to several per image) to their positions in the ULCN 2005. For all solutions the camera angles are solved for. In our initial solutions so far, camera positions are held fixed to their a priori values. In our final series of solutions we plan to solve for camera positions via solutions using our ISIS 3 [http://isis.astrogeology.usgs.gov/] adjustment program *jigsaw* which has this additional capability. We will also evaluate whether the radii of the ULCN 2005 points require updating (due to the often superior stereo geometry of the Lunar Orbiter images compared to the stereo geometry of the Clementine images that went into the ULCN 2005). If the radii of such points are updated, we plan to re-derive a global topographic (radius) model from the available ULCN 2005 point radii and the updated radii, use that to derive radii for all Lunar Orbiter control points, and do a final control network solution with the radii fixed. The updated camera angles and positions will then be used to project the images onto the updated global topographic model in order to generate a final Lunar Orbiter global digital mosaic of the Moon.

Future plans include the direct incorporation of the new tie point measurements into the original ULCN 2005 solution in order to derive a new and improved global lunar control network, tentatively called the Unified Lunar Control Network 2008.

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